

REMARKS

This case has been reviewed and analyzed in view of the Official Action dated 19 December 2002. Responsive to the rejections made by the Examiner in the Official Action, Claims 1-9 have now been canceled from this case and Claims 10-18 have been inserted to more clearly clarify the inventive concept of the Applicant.

The Examiner has rejected Claims 1-9 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. Claims 1-9, however, have now been canceled from this case and it is believed that newly-inserted Claims 10-18 now satisfy the requirements of 35 U.S.C. § 112, second paragraph.

Prior to a discussion of the Examiner's further objections and rejections made in the outstanding Official Action, it is believed that it may be beneficial to briefly review the subject Patent Application system in light of the inventive concept of the Applicant. The subject Patent Application system is directed to a power-equalizing multi-channel fiber laser array. As shown in Figure 2 of the subject Patent Application Drawings, a pumping laser source 10 generates a primary pumping laser beam. The primary pumping laser beam is received by a variable ratio optical splitter 12 for dividing the pumping laser beam into a plurality of secondary pumping laser beams. A plurality of wave division multiplexers 14 each receive a respective one of the secondary pumping laser

beams and generate a pump signal. Each pump signal is received by a resonance cavity formed by an erbium-doped fiber 16 sandwiched between a pair of fiber gratings 18. As shown in Figure 3a, each resonance cavity generates a single-channel laser beam, with all of the signal-channel laser beams forming a multi-channel laser beam.

Additionally, in a first embodiment of the system, a plurality of variable optical attenuators 20 are positioned between optical splitter 12 and wave division multiplexers 14. Each of the variable optical attenuators 20 are selectively tuned such that the power output of each individual resonance cavity is equal with respect to one another. In a second embodiment, each of the resonance cavities includes a set of resonance cavity parameters, such as length of the individual fibers 16, concentration of erbium in the fiber 16, the reflectance of the gratings, etc., such that the parameters may be selectively chosen so that power output of each individual resonance cavity is equal with respect to one another.

The Examiner has rejected Claims 1-7 under 35 U.S.C. § 102(e) as being anticipated by the Ohshima Patent #6,320,694. It is the Examiner's contention that the Ohshima reference teaches all elements of Claims 1-7, as originally filed.

The Ohshima reference is directed to an optical amplifier for use in optical communications equipment. As shown in Figure 5, the Ohshima system includes a pumping light source which generates a beam which is received by optical splitter 63.

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The split pumped light is transmitted to variable attenuators 53, 64, passes through wave division multiplexer couplers 44, 68, passes through optical isolators 45, 69, and is received by amplification media 46, 70. The amplification media 46, 70 generate respective beams which pass through optical isolators 47, 72 and wavelength selective filters 48, 73.

The amplification medium 46 is excited by the pumping light to amplify the light signal, which in turn is directed to an optical isolator 47. The amplified signal is input to wavelength selected filter 48 where only the signal is derived and then input to an optical splitter 49. When the signal light is amplified in the amplification medium 46 by use of the pumping light, optical isolators 45 and 47 are used to prevent the signal light from passing in a direction opposite to the transmission direction.

The combination of first optical isolators 45, 69, amplification media 46, 70, second optical isolators 47, 72, and wavelength selected filters 48, 73 merely produce amplified light passing in one direction. This, however, is not equivalent to separate resonance cavities. In the system of the subject Patent Application, erbium-doped fibers 16 are sandwiched between fiber gratings 18 to form resonance cavities. This, essentially, produces a plurality of separate individual lasers, thus allowing for optimal control over wavelength production and power output, in addition to phase-matching of the output signals.

Additionally, in the Ohshima reference, the variable attenuators 53, 64 are adjusted to change the amplifying gain of the signal lights. In the system of the subject Patent Application, however, variable attenuators 20 are adjusted to equalize the output powers of the multi-channel light sources. Though the Ohshima reference teaches the use of variable attenuators 53, 64, they are not used to equalize the power output of each individual resonant cavity. In the system of the subject Patent Application, the variable optical attenuators 20 may be individually selectively tuned in order to equalize the power output of each resonance cavity.

Further, the Ohshima reference does not set any sort of parameters regarding the amplification media 46, 70. In the system of the subject Patent Application, however, each resonance cavity has associated with it a set of resonance parameters. These parameters, such as length of fibers 16, concentration of erbium in fibers 16, reflectance of gratings 18, etc., may be selectively chosen in order to produce equal power outputs amongst the individual single-channel laser beams.

Thus, the Ohshima reference does not provide for: "...each said erbium-doped optical fiber being sandwiched between a pair of fiber gratings to form a resonance cavity...", as is clearly provided by newly-inserted Independent Claims 10 and 16. Further, the Ohshima reference does not provide for: "...each said resonance cavity being defined by a set of cavity parameters, said cavity parameters being selected such that

power output of each said resonance cavity is equal with respect to one another...”, as is clearly provided by newly-inserted Independent Claim 10. Additionally, the Ohshima reference does not provide for: “...each said variable optical attenuator being selectively tuned such that power output of each said resonance cavity is equal with respect to one another...”, as is clearly provided by newly-inserted Independent Claim 16.

Thus, based upon newly-inserted Independent Claims 10 and 16, it is not believed that the subject Application is anticipated by, or is made obvious by, the Ohshima reference when Independent Claims 10 and 16 are carefully reviewed.

The Examiner has further rejected Claims 8 and 9 under 35 U.S.C. § 103(a) as being unpatentable over the Ohshima Patent #6,320,694. It is the Examiner’s contention that it would have been obvious to one of ordinary skill in the art at the time the invention was made to pump the fiber laser array at a given wavelength in order to obtain a desired output wavelength, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

As explained above, however, the Ohshima reference does not provide a plurality of resonance cavities, essentially forming a plurality of separate fiber lasers. The Ohshima reference, as shown in Figure 5, provides amplification media 46, 70 positioned, respectively, between a pair of optical isolators with respective wavelength

selective filters 49, 73. These do not form separate resonance cavities, acting as separate laser sources. In the system of the subject Patent Application, however, a plurality of erbium-doped fibers 16 are sandwiched between respective pairs of fiber gratings 18, thus forming a plurality of resonance cavities.

Further, in the Ohshima reference, as explained above, the variable attenuators 53, 64 are adjusted merely to change the amplifying gain of the input signals. In the system of the subject Patent Application, however, the power-equalizing variable optical attenuators 20 are provided for selective adjustment and tuning of each attenuator such that each individual resonance cavity produces an equal power output with respect to one another.

Additionally, as explained in the arguments above, the Ohshima reference does not provide any sort of selective parameters for the amplification media 46, 70. In the system of the subject Patent Application, however, each resonance cavity has associated therewith a set of resonance cavity parameters, with the selective adjustment of these parameters allowing for equal power output of each resonance cavity with respect to one another.

Thus, the Ohshima reference does not provide for: "...each said erbium-doped optical fiber being sandwiched between a pair of fiber gratings to form a resonance cavity...", as is clearly provided in newly-inserted Independent Claims 10 and 16.

Further, the Ohshima reference does not provide for: "...each said resonance cavity being defined by a set of cavity parameters, said cavity parameters being selected such that power output of each said resonance cavity is equal with respect to one another...", as is further provided in newly-inserted Independent Claim 10. Additionally, the Ohshima reference does not provide for: "...a plurality of variable optical attenuators, each said variable optical attenuator receiving a respective one of said secondary pumping laser beams and generating an attenuated laser beam...each said variable optical attenuator being selectively tuned such that power output of each said resonance cavity is equal with respect to one another...", as is further provided by newly-inserted Independent Claim 16.

Thus, based upon the newly-inserted Independent Claims 10 and 16, it is not believed that the subject Application is made obvious by the Ohshima reference when Independent Claims 10 and 16 are carefully reviewed.

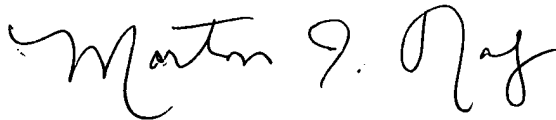
It is now believed that the remaining Claims 11-15, 17, and 18 show patentable distinction over the prior art cited by the Examiner for at least the same reasons as those previously discussed for Independent Claims 10 and 16.

The remaining references cited by the Examiner but not used in the rejection have been reviewed, but are believed to be further removed when patentable distinctions are taken into account than those cited by the Examiner in the rejection.

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It is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Morton J. Rosenberg". The signature is fluid and cursive, with the first name "Morton" being more prominent.

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6/18/2003

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